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## THE TRUE AND THE FALSE IN DARWINISM.

A CRITICAL REPRESENTATION OF THE THEORY OF ORGANIC DEVELOPMENT. BY  
EDWARD VON HARTMAN. BERLIN, 1875.

TRANSLATED FROM THE GERMAN BY HENRY I. D'ARCY.

*III. The Theory of Heterogeneous Generation, and the Theory of Transmutation.*

Although we shall not consider any further the other instances of ideal relationship in the natural system, but shall devote ourselves simply to a consideration of the theory of descent, yet we deem it proper to repeat that the theory of descent is broader than Darwinism. The latter is a particular theory of transmutation — that is, it assumes that the derivation of every species from another is effected through a gradual change of type, by means of repeated infinitesimal variations. The theory of descent, as such, does not, indeed, exclude this principle, but it does not depend upon it, for it also allows quite different views as to the manner in which one type springs from another. The theory of transmutation is not even the most natural one, since direct experience furnishes no instance of an actual transmutation of one well-defined species into another, but rather points to the old doctrine of the constancy of species, a doctrine which can only be disproved by a critical examination of the transitional character of the difference (*flüssigen Unterschieds*) between undeveloped, developed, and overdeveloped (*überreifen*) species. The most natural supposition is, rather, that the first ovum of the species about to be created is produced in the ovary of a closely-related species, by a change, at the earliest moment, in the tendencies of the embryo. This process by which parents of one species produce young of a new species has been styled by Kölliker<sup>1</sup> “heterogeneous generation.” Here,

<sup>1</sup> Compare Kölliker “Ueber die Darwinsche Schöpfungs theorie,” Leipzig, 1864; and “Morphologie und Entwicklungsgeschichte des Pennatulidenstammes nebst allgemeinen Betrachtungen zur Descendenzlehre,” Frankfurt, 1872.

also, there is a transmutation or change, but the process is instant, and not one consisting of numerous short stages; and, of course, this sudden change is never visible, but is a germ-metamorphosis which leads to the creation of a new species. In this form, as "a change of types through germ metamorphosis," the theory of descent was maintained in Germany by Heinrich Baumgärtner<sup>2</sup> before Darwin or Kölliker.

This view of course renders hopeless any attempt to explain the processes which occur in the embryo and introduce a new species merely by the mechanical influence of accidental external causes, and points steadily to the assumption of an internal development according to law, though of but occasional occurrence. It was, perhaps, this which repelled the natural philosophers, who were most wedded to a mechanical conception of nature, from this form of the theory of descent, and led them to a belief in the exclusive efficacy of the transmutation theory, in the sense above indicated, in which the law of internal development is sought to be, apparently, eliminated by a subdivision of the process of change into numerous minute stages. On the other hand, those who ascribe considerable importance to this inner law allow themselves, on account of the erroneous belief of the Darwinians that they have eliminated such law by means of the transmutation theory, to be misled into a certain groundless opposition to this theory, which, nevertheless, can be easily maintained within certain limits—that is, so far as the gradual transmutation is regarded as the external medium of the ideal change of type, and, therefore, the means used by the principle of development for the attainment of its ends. As the type of every species includes within it a greater or lesser number of varieties, some particular varieties of the two most closely related species must be more closely related to each other

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<sup>2</sup> The works of Baumgärtner are: "Ueber die Nerven und das Blut," 1830; "Lehrbuch der Physiologie," 1853; "Blicke in das All," 1857; "Natur und Gott," 1870. The chapters of this work, from the third to the sixth, are particularly instructive, but the remainder of it is of a disconnected and *dilettante*-like character.

than any other two, and even the strongest advocates of the constancy of species are obliged to admit (Wigand, page 18) that there are species whose extremities nearly or quite run into each other; at any rate, the most closely related varieties of two species form the best bridge for germ-metamorphosis, and, in the case of contact of two species, heterogeneous generation itself is only a link in the chain of gradual transmutation which connects the centers of both species.<sup>3</sup>

It is obvious that heterogeneous generation and gradual transmutation are by no means conflicting theories; the difference between them is rather one of degree. For we may conceive transmutation to be as gradual as we please, yet the shortest steps are not, in a mathematical sense, infinitely short; every deviation, be it ever so small, is consequently, in the strict sense of the term, a leap of nature, and the question is only whether the leap is longer or shorter. If it passes a certain limit, it is called heterogeneous generation; but what this limit is, no one dares to determine. Should we seek it at the point where there occurs a change of the type of a species, we would forget that in those species whose extremities run into each other the deviation may be much less than we often see before our own eyes when a new variety suddenly appears. On the other hand, we should take care when there is a direct descent of one species from another, and a considerable difference between their forms, not to infer the existence of intermediate varieties, now lost, in order to serve as connecting links; because we have no means of

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<sup>3</sup> The fact must be by no means overlooked that, in germ-metamorphosis, not only the visible type, but also the latent tendencies, must experience a modification; especially must the transition be effected from the tendency in a border-variety (*Grenzvarietät*) to repeat itself to the tendency to vary itself. The advocates of the constancy of species may contend that heterogeneous generation is, in this, specifically different from transmutation; but it should not be forgotten that the latent process by which the tendency to repeat is changed into the tendency to vary can as easily be divided into a series of minute germ-metamorphoses, and distributed through several generations, as the process of external change can. It is only where an entire organ suddenly appears, or where the numerical relation of morphological features suffers a change, that, as we shall soon see, a germ-metamorphosis must be recognized which represents a leap (*Sprung*) in the newly thrown-off germ-cell of such organ or feature which, from its nature, cannot be divided into minute steps.

knowing what leaps nature may make in the process of heterogeneous generation; and it would be entirely premature to undertake, without any real *data* for such a calculation, to prescribe limits to *nature's utmost stretch in germ-metamorphosis*. Heterogeneous generation and gradual transmutation have each a place in the process of organic development, and it is as one-sided to exclude, with Darwin, the former in favor of the latter as it is to exclude, with Wigand, the latter in favor of the former. These are hypotheses in a domain where all empirical certainty fails, and where we should be rejoiced to secure even what promises to be an instrument for the removal of the many existing difficulties.

As we were forced to complain, in a former chapter, because Darwinism regards every proof of an ideal relationship of species as a proof of their genealogical relationship, so we must now, in like manner, characterize as a second error the claim that every possibility of an actual genealogical connection is an additional support to the theory of transmutation. For the same reason as that which led us before to consider the facts that favored an ideal, to the exclusion of a genealogical relationship, we now deem it prudent, in correction of the second error of Darwinism, just mentioned, to consider the facts which, in many cases, seem to weaken the theory of gradual transmutation, and to support that of heterogeneous generation.

The phenomena of alternate generation (*Generationswechsel*), and of dimorphism, are generally relied upon to establish the fact that the production of a type entirely different from that of the parents is by no means uncommon in nature. But both comparisons are deficient in this, that the offspring is different from the parents only in its external attributes, while it retains the power inherited from them of reproducing the ancestral type. Each of these two phenomena appears, from this stand-point, as a process analogous to that of the metamorphosis of insects and amphibious creatures, with the exception that in metamorphosis the phases of development which the type of the species undergoes are included in the life of one individual, whereas, in dimorphism they are

separated in space, and in alternate generation they are separated in time, and distributed among different individuals. These processes would only lead to the origin of new species if an inner change of tendency were added to the outer change of form—that is, if the butterfly should deposit eggs out of which would come, not caterpillars, but butterflies; or if, from the two dimorphous types of one species, one or both should cease to reproduce both types jointly, and should only reproduce offspring of one type; or, finally, if the two or more occurring in alternate generation should cease to alternate, and should reproduce each its second type (*Sondertypus*.)

It is by no means impossible that such processes may have led to the origin of new species; indeed, perhaps it was chiefly by these, or processes similar to them, that the advance was effected from lower to higher orders in the animal kingdom, viz., from worms to insects, or from fishes to amphibious animals; and Darwinism itself, depending upon such occurrences as the exceptional change of the axolotl into an animal like a salamander, or the issuance of perfectly formed frogs from spawn, in those islands where there is no fresh water, inclines to such conjectures, though, of course, admitting that they are entirely without proof. But, if these conjectures were well founded, these phenomena would be strong evidence against gradual transmutation, and in favor of heterogeneous generation. We should find in all these cases a peculiar division of the process of heterogeneous generation into two germ-metamorphoses, separated from each other by, perhaps, very long intervals of time, one of which produced the change of type relatively to the outer form, and the other the change in the procreative tendency. The latter must, naturally, be a sudden and abrupt change, and must, therefore, utterly exclude all gradual transmutation. The former may, under some circumstances (for instance, in the case of dimorphism), be produced by gradual transmutation; but, generally (in metamorphosis, and in alternate generation probably always, and in dimorphism probably as a rule), it must be regarded as a sudden spring of the new type out of the old, which still, in some way, retains its characteristics. This certainly must be

regarded as alone probable in all those cases where both types are distinguished from each other, not only by different colors and by the different shape of their respective morphological structures (as generally happens in dimorphism), but where the morphological type which appears is of a higher order, and passes *per saltum* from a lower to a higher grade of organization.

The new science of comparative embryology, which, indeed, frequently fails to answer our most pressing questions, but must yet, when it speaks, be regarded as the safest guide through the labyrinth of descent, and the best criterion of the alternative, "ideal or genealogical relationship," leaves us, from the nature of the case, completely in the dark with regard to the other alternative, "transmutation, or heterogeneous generation." For, whatever may have been the advances in the direct ancestral line of a particular embryo, the abbreviation of the phylogenetic development which is presented in the ontogenetic is too great to warrant inference as to the mode of transition from one plane to the next. It is only in relation to the morphological changes of types that embryology gives valuable aid in showing that all the more important organs are developed by throwing out cells at a very early period of the individual's life; and the fact is well utilized by Baumgärtner ("Natur und Gott," 4 Abschnitt) against the theory of Transmutation, and in favor of Germ-Metamorphosis. For, no matter how far back in the line of progenitors we may go, a morphologically distinct organ always points to an origin in the germ-cells of the embryo, and never to actual acquisition by a particular animal during its life. Only the latter, however, would enable the transmutation theory to account for morphological changes, while the former represents the first appearance of the germ-cell of a new organ, in the embryo of a species which did not before possess such organ, as a new occurrence taking place suddenly at a particular period of the phylogenetic development, by which occurrence is at once effected the morphological change of the type in its perfect state. So embryology affords no support to the transmutation theory, while it decidedly favors

heterogeneous generation, in accordance with internal laws of development.

The same is true of palæontology, although it is just here that the Transmutation theory, on account of the rapid discovery of intermediate forms, claims its greatest triumphs. But it is quite clear that only such intermediate forms can strengthen the Transmutation theory as, in the first place, are only separated from the forms which they connect by exceedingly small intervals; and, in the second place, demonstrably constitute, not merely systematic, but genealogical, links between such forms; both conditions must co-exist, or the evidence fails.

Darwinism, however, is very far from requiring these conditions in the materials gathered by it in the support of the Transmutation theory; it treats all intermediate forms, at once, as going to establish that theory. On close inspection, however, it is manifest that where the first condition probably exists the second is wanting, and where the second exists the first is wanting. As to the filling-up of the large gaps in the natural system where discovered forms represent, not only species, but lost orders and families, we can often conclude, with reasonable probability, that we have found a type which genealogically connects types of a higher and of a lower order very widely separated; but just in such cases the materials for the filling-up of these gaps are relatively so few that we must presume that phylogenetic development, with the help of heterogeneous generation, has made considerable leaps between species, which, perhaps, are still to be inserted in the intervals left by the types already discovered. For, if we should suppose that such great gaps have been filled up by gradual transmutation, such long periods of time and such an enormous number of individuals would, according to Darwin's own views, be required for the purpose that the extraordinary scarcity of palæontological materials from these numberless generations, in comparison with the rich funds secured from other domains of Flora and Fauna, seems scarcely explicable. Should we, however, regard the periods of change as short, relatively to the periods of unchanged ex-

istence (Ph. d. Unbru., 8ter Ausg., cap. 10, Schluss), the scarcity of palæontological forms is, indeed, explained, and the hope of further discovery still left open, but the prospect of ever filling up such gaps with continuous series of transitional forms is gone forever.

When, on the other hand, the continuity of the form-line is preserved, the necessary evidence that such line is really a genealogical, and not merely a systematic, one (see the distinction between these in the preceding chapter) is entirely wanting. The existence of a genealogical series would be only probable, though by no means certain, if geology showed that the horizontal *strata* contained types of a very different kind, and that these types formed a continuous scale in a vertical direction, and developed themselves perpendicularly, or by means of bifurcations, and did not, as it were, in cyclic fashion return to themselves.

But, as a matter of fact, this state of things is not found, and, when closely examined, the facts which are most triumphantly advanced in favor of the transmutation theory oppose it, and support heterogeneous generation, as regards the transition from a variety of one species to that of another.

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## HEGEL ON CLASSIC ART.

[TRANSLATED FROM THE SECOND FRENCH EDITION OF CHARLES BÉNARD'S TRANSLATION OF THE SECOND PART OF HEGEL'S *ÆSTHETICS*.]

BY WM. M. BRYANT.

### PART II.

#### CHAPTER V.—OF THE CLASSIC FORM OF ART.

1. Unity of Idea and Form as the Fundamental Characteristic of the Classic.—2. Of Greek Art as Realization of the Classic.—3. Position of the Artist in this new Form of Art.

The intimate union of matter or content with form—the mutual adaptation of these elements together with their